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SCIENCE NEWS-LETTER

The Weekly Summary of Current Science

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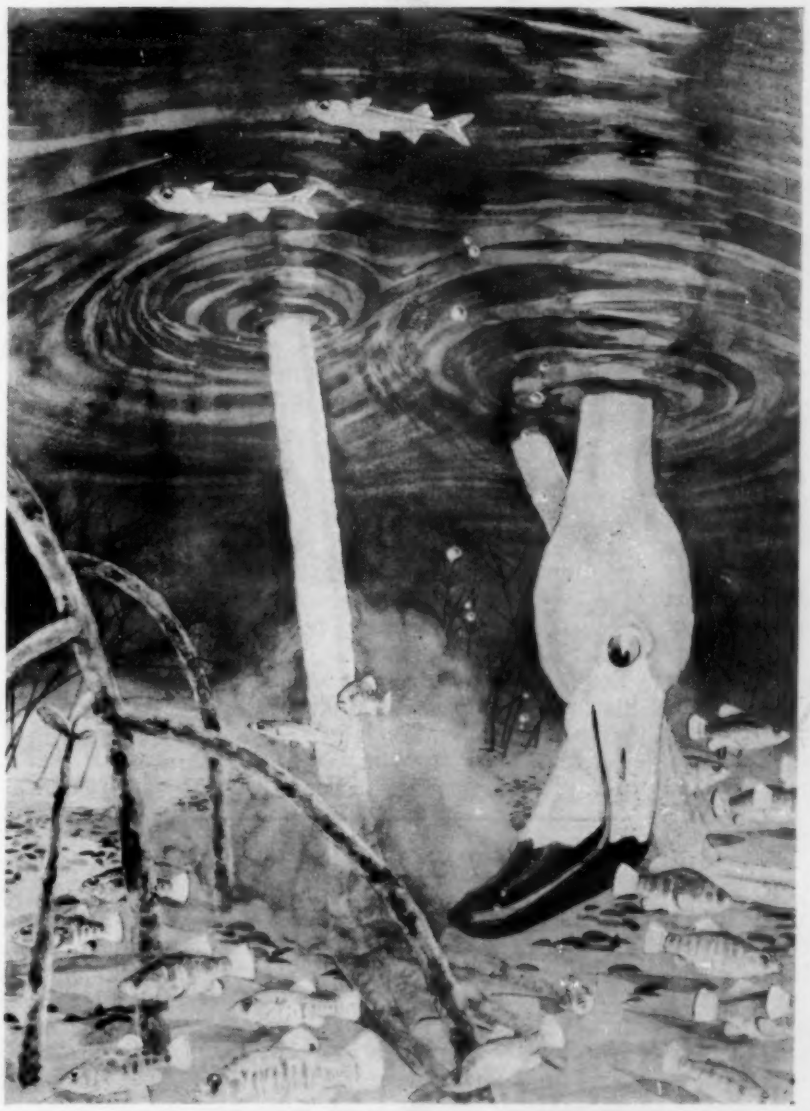

AS THE FISH SEE IT

Under Water in a Florida Mangrove Swamp

(See page 22)

Vol. XVI No. 431

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Pacific Most Likely for Uncharted Isles

Geography

Even though modern map makers have charted almost every scrap of land on the earth, whether large or small, there may still be some uncharted islands in the vast stretches of the Pacific. Successors to Defoe wishing to write of an unknown island upon which their hero is shipwrecked, might still do so without fear of contradiction if they placed it in the Pacific Ocean, slightly south of the equator and about a hundred miles south of the Caroline Islands. This region is to the north of New Guinea; it is out of the way of steamer tracks and has never been adequately charted.

But, on the whole, Robinson Crusoe would have a difficult time today trying to find an unknown desert island to get wrecked upon. In his time, a little more than two hundred years ago, the Pacific Ocean was dotted with thousands of unknown, uncharted islands, both verdure-clad and barren.

The profusion of these oceanic oases, especially in the equatorial region, and the fact that they were not placed on any sailing charts, made it an easy matter to pick out a nice, lonely island as remote from the world of men as a corner lot on Mars. Alexander Selkirk, the original Robinson Crusoe, lived on the island of Juan Fernandez, three hundred and sixty miles west of Valparaiso, for three years without seeing another human being.

The story of the discovery and charting of the Pacific's islands is a fascinating tale, replete with romance and studded with the names of many doughty adventurers. Islands have been discovered, lost, and in some cases rediscovered. The Solomon Islands, for instance, were lost for two centuries and then found again. Most interesting, however, are those phantom isles sighted once or twice by mariners of sailing ships and then never seen again. A great deal of this island hide-and-seek was due to uncertain methods of determining latitude and longitude at sea. The rest was due to the sighting of floating patches of marine life which, at a distance, looked like islands, to submarine earthquake and volcanic action which might push a mass above the surface of the water temporarily, and to the ever-active imaginations of deep-water sailors.

Fifty years ago more than a thousand tiny phantom isles were reported to freckle the Pacific's seventy million square miles. The United States Hydrographic Office, at that time, published a "List of Reported Dangers in the Pacific Ocean." The list, in three volumes, contained over three thousand reported shoals, reefs, and islands, most of them with the notation "Existence Doubtful" or "Position Doubtful". Today, the majority of these reported dangers, especially the islands, have definitely "disappeared".

Although possible, it is improbable that other islands may be discovered in the vastness of the Pacific's wilderness of waves. The improbability of this lies in the fact that submarine volcanic and earthquake activities have caused wrinkle-like elevations of the ocean's bottom on which the many groups of islands occur and the general direction of these "wrinkles" may be fairly easily traced.

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Telephoned Pictures in British Press

Phototelegraphy

American equipment for picture transmission, similar to that now used for sending photographs from New York to San Francisco over telephone and telegraph wires, permits the Glasgow and Manchester editions of the London *Daily Express* to publish the same pictures that appear in the London edition. While all the large cities in England have their own newspapers, the London papers circulate throughout the British Isles to an extent far greater than that of any New York papers in other parts of the United States. To expedite the distribution, several of the London papers have branch publishing houses in other cities, where editions are printed closely resembling the London edition of the same day. News can be telegraphed promptly, but previously photographs had to be mailed, with the loss of several hours.

In a report just made to the Bell Telephone Laboratories in New York, L. A. O'Brien, who directed the installation of the equipment, described the operation of the system.

Every day from 6:00 to 10:00 p. m. the *Daily Express* has a private wire leased from the British Post Office, which operates the telegraph and telephone service, over which the pictures can be transmitted. About eight five by seven inch pictures can be sent in an hour. On the average fifteen pictures are sent every day. The pictures are retouched before they are sent to simplify the work at the receiving end. At present most of the transmission is from London to Manchester and Glasgow, where the pictures are received simultaneously. So successful has been the operation of the system, however, that two-way equipment will shortly be installed at all the stations, so that pictures may be sent from any of the three cities to the other two.

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Edison's Search for Genius

Psychology

By Emily C. Davis

Can Thomas A. Edison look over the entire United States and pick out a high school boy preeminently fitted to carry on the Edison tradition of many inventions? Psychologists and the public as a whole are awaiting with interest the answer to this question.

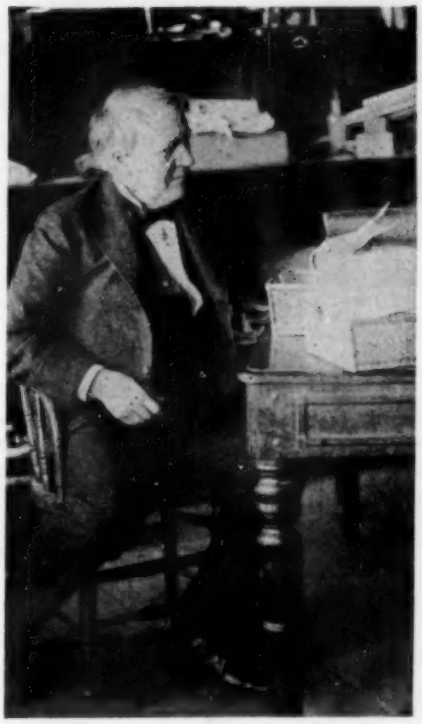
For the quest, if successful, will be more than simply the dramatic finding of one genius by another. It will mean that human beings are advancing to the point where they can detect unusual ability in its early stages, so to speak. It will mean that perhaps at last genius can be recognized and encouraged and trained as it never has been in the world's history. In other words, dealing in human futures will be getting to be a science rather than the old game of pure chance.

Edison's project has this broader significance because he is attempting to pick his scientific boy genius, not by intuition, but by that typical device of the twentieth century, the test questionnaire. The announcement of the now familiar contest declared that each state and the District of Columbia was invited to select its candidate. That is, each state must work out a method of selecting a potential electrical wizard from among its youthful science fans. The 49 high school graduates are next to meet at the Edison laboratories and to battle for a college scholarship. They will not be turned loose with an assortment of wires and apparatus and told to invent something. It is planned that they will be faced by tests or questionnaires to probe the range of their knowledge of science and other abilities. The winner goes to college. After that—well, the announcement continued:

"As the weight of advancing years falls on the great inventor's shoulders he is seeking a youth of unusual capacities who, perhaps, will have the genius to carry on the great work he has so well started."

Psychologists who have studied the whys and wherefores of mental development have been queried as to whether Edison is likely to find his boy genius, and what aid science can render in such an undertaking. Their opinions differ widely, but on the whole they do not feel that the quest is hopeless.

"It almost takes a genius to discover a genius, especially a young



GENIUS EDISON. . . seeks his successor

one," is the epigrammatic, rather discouraging pronouncement of Dr. Arnold Gesell, of the psycho-clinic at Yale University and well-known authority on child development.

Dr. Gesell has ideas, however, as to how potential genius may be spotted. There is no general type of genius, he reminds us. The Edison brand of mentality is very different from the Einstein brand or the Kreisler brand.

"Deliberately to go about finding a successor for any great man it would be necessary to make an inventory of the actual qualities desired and to specify the particular combination in which they are preferred," he states. "The qualities would include somewhat general factors like energy, pertinacity, insight, imagination, and the capacity for growth. But they would also include specific habits of work, modes of thought, fields of interest, likes, dislikes, motivations. They would include forms of skill, technical training and knowledge."

If Edison's own boyhood may be taken as a criterion for the development of another genius of the same sort, his successor would be a boy with a remarkable memory. He would not be particularly husky physically, which might result in his education being of the home-made variety. He would be an experimenter from the age of six or so. He would take an early interest in science, particularly chemistry, later electricity. He would develop a shrewd commercial capacity in his early teens, realizing that by earning money he could buy chemicals and apparatus for more interesting and exciting experiments. Altogether, he would be rather an unusual boy.

Edison's assistant, W. H. Meadowcroft, writing of this boy Edison, has said:

"To others of the family than his mother he was accounted a strange boy, some believing him to be mentally unbalanced. His mother, however, understood that his was no ordinary mind, for she had studied him thoroughly. While she watched him closely, she allowed him the widest possible sphere of action and encouraged his ever-increasing studies."

Judging by Edison's own boyhood career, a formula for his type of genius might include curiosity and interest in science, particularly chemistry and electricity; concentration and persistence; cleverness with his hands; a strong memory; practical judgment and commercial ability. The amounts of such qualities are not so significant as the pattern they form when they combine in a personality, according to Dr. Gesell. An abnormally large amount of stick-to-it-iveness if teamed up with defective knowledge of science and erratic technique is not likely to produce results of great value to civilization. The same abnormal persistence, given more favorable opportunity for an outlet, might produce work that would win the title of genius for an inventor.

Because genius comes in patterns and not in doses, Dr. Gesell believes that an informal questionnaire could scarcely provide an adequate scale for rating geniuses.

"Science is making definite progress in the measurement of mental ability," he says. "But capabilities of the highest order cannot be adequately measured by any known device. They cannot even be justly estimated except by thorough-going and judicious appraisal of numerous factors. The capacity for sustained growth is one of the most important but most difficult to assess.

Dr. Louis M. Terman, of Stanford University, who has conducted comprehensive studies (*Turn to next page*)

Edison's Search for Genius—*Continued*

of genius in children, regards Edison's search for genius as one of the most creative, challenging, and daring of all his undertakings.

"True, neither science nor common sense has yet solved the riddle of genius," Dr. Terman adds. "But psychology has made a beginning. There is nothing about genius that is not amenable to scientific investigation."

Dr. Terman advocated that each

TELEVISIONARY. C. FRANCIS JENKINS was already an inventor when this picture was taken

state should select its most promising boy scientist with care. Every high school senior class in the state should be sifted. A small committee of psycholgists and physical scientists should conduct the search. This California psychologist, who has studied 1,000 superior children in his state, believes that the best method of picking a genius would be by first giving an intelligence test. The top rank of the survivors should then be given a test of their aptitude for science. The dwindling group of "best minds" would then go up for tests and observations as to their character and personality, including such traits as industry, persistence in the face of difficulty, unselfishness, cooperation and health. If there were still too many survivors, some weight might be given to a fine heredity record based on the qualities shown by blood relatives.

So far as Mr. Edison's final selection is concerned, Dr. Terman believes that "the whole bet should not be staked on one horse. If the ten most promising are selected and trained, the inventor will have a better chance of finding ultimately the one individual he wants."

Still more specific than Dr. Terman in his suggestions on how to pick a scientific genius, is Dr. Walter V. Bingham, director of the Personnel Research Federation. Psychological problems of men and women in relation to careers and industries are Dr. Bingham's specialty.

"There can be no successor to Edison," declares this industrial psychologist. "In his place there will be a whole group of investigators working together. The day has passed when one inventor, no matter how brilliant, can outstrip the organized cooperative efforts of a great research laboratory. But such laboratories need young men of precisely the type Fdison is seeking."

To select the most promising, Dr. Bingham would allow at least two or three days for examination.

"Edison's questionnaires, to judge from those which have been published, are not reliable enough," he believes. "The inventor seems never to have applied to them the rigorous scientific standard of verification which he imposes on his physical and chemical researches. The separate items in the questionnaires need severe pruning and experimental validation."

In other words, Edison has not tested his tests so completely as psychologists do by trying them out on large numbers of individuals and closely analyzing the results. If a psychologist who is devising an intelligence test finds that children known to be bright do not make better ratings than dull children on certain parts of the test, he suspects that something is wrong with his questions. They may measure some quality of mind, but not intelligence. So, he experiments and changes until the test is standardized.

Dr. Bingham goes on to say that when the 49 young men are assembled at the laboratory in Orange, they should be given a wide range of tests.

"The competition might well make use of some of the well standardized tests of scientific and mathematical ability, mechanical ingenuity, logical memory, and constructive imagination or inventiveness," he suggests. "The battery of tests should include Zyve's tests of scientific aptitude, Thurstone's tests of special thinking, and the Minnesota mechanical ability tests, together with such measures of ingenuity as the Carnegie Imagination Test, Huger's puzzles, and O'Connor's block assembly. Three hours should be set aside for the Thorndike test of abstract intelligence. If an information test were to be included in the battery of tests, I would use the Inglies vocabulary test as revised by O'Connor. Strong's interest analysis for revealing engineering aptitude would help. The physique of the candidates should also be compared by measuring their endurance and output of energy. Finally, their individual rankings in all the separate examinations should be properly weighed and combined in a convenient and statistically sound manner."

If there is a mind like Edison's among the candidates, Dr. Bingham concludes that this is the surest way to find it.

One outstanding result to be ex-

TELEPHONE'S BELL. Would Edison's test have detected his genius?

pected from the quest for genius is that it will stimulate general interest in the subect of special aptitudes and individual differences. This is the phase of the situation which interests Dr. L. J. O'Rourke, director of personnel research of (*Turn to next page*)

Fatal Gas Used in Few Refrigerators

Engineering

Deaths as a result of gas leaks from automatic refrigerators, such as occurred in Chicago recently, are unlikely to be repeated very extensively elsewhere, in the opinion of government experts. Of 63 makes of electric and automatic refrigerators compiled in a recent list, only 23 make use of methyl chloride, the gas responsible for the Chicago fatalities, as a refrigerant. Of these, only one is a nationally advertised make. Furthermore, the only danger comes from central refrigerating plants, used in apartment houses, where the refrigererant is piped to a number of cold boxes throughout the building. Even when methyl chloride is used in a small independent home unit, a leak would not liberate enough of the gas to cause danger.

Sulphur dioxide, the choking gas that results from the burning of sulphur, is the most popular cooling compound, and is employed in the two most widely used electric refrigerators. While this is irritating to the nasal passages, it is not really poisonous, in the same sense as the poison gases used during the war. Its pungent smell is recognized before it reaches dangerous concentrations. Ammonia, used in many refrigerators, is safe for the same reason.

Methyl chloride is odorless, and, while it is not poisonous in itself, a large concentration would exclude the necessary oxygen, and death would result if a person were kept in a closed room with it. Many manufacturers use it in combination with either ammonia or sulphur dioxide, which have characteristic odors that reveal leaks. For a similar reason, manufacturers of illuminating gas, which consists largely of odorless and poisonous carbon monoxide, mix other gases with it that give the characteristic odor. One manufacturer of refrigerators makes use of ethyl chloride, which is not poisonous but is highly inflammable. Attempts have been made to mix methyl bromide with it to lessen the fire danger, but methyl bromide is truly poisonous.

Carbon dioxide, which makes up a large percentage of our very breath, is used in one make of refrigerator. This is also the refrigerant used in cooling systems of battleships.

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Edison's Search for Genius—*Continued*

the U. S. Civil Service Commission. This psychologist, who directs the planning of tests for the government service, says that the varied ways of selecting a genius tried out by the 48 governors and the commissioners of the District of Columbia should present striking comparisons and contrasts, and these should serve as a challenge to research students to improve their methods of selecting individuals with talent.

Dr. O'Rourke further suggests that it would be an attractive proposition, though a difficult one, to follow the careers of all the 49 boys; to compare the contributions to science that may be made by the boys with the highest ratings on the competitive examinations with the contributions to science made by boys rating the lowest on the tests. These 49 careers, if they could be followed, might furnish valuable evidence as to the success of different methods of detecting symptoms of genius.

The boyhood of scientific genuises, past and present, offers some guidance as to the sort of boy who grows up to be a giant in the world of science and invention. When Dr. Catherine Cox of Stanford University studied the boyhood of 282 geniuses of history she found 39 scientists among the set. A striking fact about these boys is their early attraction to science. Newton, destined to make his famous observation on apples and gravity at the age of 23, was the sort of boy who spends his time with hammers, saws, and hatchets, constructing models of machines and other contrivances. Young Galileo's favorite pastime, Dr. Cox found, was the construction of ingenious toy machines. The boy Franklin had a special liking for the water, and his boyish inventions included a kite for accelerating progress through the water and pallets for rapid swimming.

Approaching more recent times, we find Alexander Graham Bell amusing himself as a boy collecting beetles, wild flowers, and minerals. He was an early pioneer in amateur photography. Being the son of a well-known teacher of elocution and authority on mechanics of speech, Bell became attracted to the problems of voice transmission at an early age, and kept up his interest in this subject all his life.

C. Francis Jenkins, one of the inventors who has made possible our moving pictures, was at his life work of inventing before he was out of baby skirts. He tells how, while still wearing dresses, he sawed a hole in the barnyard fence and solved the problem of a locked gate that kept him away from the horses and cows. As a youngster, he invented a jack to raise wagon wheels, for use in greasing axles, and so popular did the design become in his neighborhood that Francis and his brother pooled their capital and made five jacks to sell in the city. An air pump and other scientific apparatus at the district school was presented to young Jenkins on one occasion, because it was little used and "he seemed the only one liking it."

Little Carl Steinmetz had a hard time learning the multiplication table, and his early teachers thought him a dull pupil. The fact was, he had been spoiled by an indulgent grandmother and had never set his mind to doing difficult tasks. By the time he was ten years old, however, interest in arithmetic awakened, and he grew up to be one of the few scientists who could understand the work of Einstein.

Persistency of interest is a trait which has appeared again and again in the boyhood careers of the inventors of the past and present times. Among the geniuses of the past studied by Dr. Cox more than three-fourths belonged to upper, educated classes, and the average child genius had an unusually good opportunity for education and inspiring social contacts. But often the education was not of the standard classroom variety. That of Edison, the inventor that the present quest aims to match, certainly was not acquired by the usual formal methods.

After all, perhaps the best way to find another Edison would be for the inventor himself to take the most up-to-date tests that psychologists have devised. Then, using his ratings on the tests as a standard, he could proceed to give the tests to the boy competitors, and find the mind most like his, making some allowance for differences in age and experience.

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Electron Waves -- in What?

Physics

J. W. N. SULLIVAN, in *The Bases of Modern Science* (Doubleday, Doran):

One very important conditioning factor of scientific theories is the contemporary state of scientific instruments. A scientific theory has reference to observations, and these observations are conditioned by the instruments used in making them. But there is no convincing reason to suppose that a given set of observations uniquely determines a scientific theory. We have to allow, also, for the type of mind which, as an historical accident, attained the level of genius at that moment. Nevertheless, although something must be allowed for the subjective factor, we cannot suppose that a given set of observations lend themselves to an indefinite variety of interpretations. It is possible that science can no longer be pursued except in terms of the sort of abstractions that are now being used.

In this connection it is interesting to notice that an alternative theory to Heisenberg's, due chiefly to Schrödinger, and which issues in the same equations, seems, at first, to be more easily picturable. Just as the theory of light as "rays" has to be replaced, for the description of certain phenomena, by the theory of light as "waves," so the conception of "masses" moving in "orbits" is replaced, in Schrödinger's theory, by trains of waves. A hydrogen atom, on this theory, is a region permeated by waves. The waves fall off very rapidly and become inappreciable at a distance from the centre, which is found to be the same as the empirically determined radius of a hydrogen atom. But when we inquire into the physical meaning of the symbol that obeys these wave equations we find that it has no direct physical meaning. The pictorial imagination, which seizes on waves as intelligible, is baffled by the fact that the quantity which is waving has no direct physical significance. We are again in the region of logical constructions which are not picturable.

In spite of the immense degree of co-ordination effected by relativity theory the science of physics, at the present time, is very far from being a unity. The scientific ideal of giving a mathematical description of all natural phenomena in terms of a few simple entities and principles seems farther from realization than it has been at any period since Newton. Our greater knowledge has given us a sight of deeper difficulties and more irreconcilable facts. And yet the impression is strong that we are on the eve of some great illumination, as if the physics of the moment is in the darkness that precedes the dawn. At present special methods are devised for special problems. These special methods are not obviously connected, and yet, if Nature is a unity, we must suppose the problems to be connected. It is possible that these special methods will turn out to be partial aspects of some great generalization, and that the difficulties they now present, their enigmatic quality, are due to their partial character.

It is probable that the most far-reaching changes in our concepts will occur in connection with quantum theory and its relation to the wave theory of light. Two passages, admirably illustrating the disadvantages and advantages of the quantum theory, may be quoted from Dr. Jeans and Dr. Ellis, respectively:

"If, however, radiation is to be compared to rifle bullets, we know both the number and size of these bullets. We know, for instance, how much energy there is in a cubic centimetre of bright sunlight, and if this energy is the aggregate of the energies of individual quanta, we know the energy of each quantum (since we know the frequency of the light) and so can calculate the number of quanta in the cubic centimetre. The number is found to be about ten millions. By a similar calculation it is found that the light from a sixth-magnitude star comprises only about one quantum per cubic metre, and the light from a sixteenth-magnitude star, only about one quantum per ten thousand cubic metres. Thus, if light travels in indivisible quanta like bullets, the quanta from a sixteenth-magnitude star can only enter a terrestrial telescope at comparatively rare intervals, and it will be exceedingly rare for two or more quanta to be inside the telescope at the same time. A telescope of double the aperture ought to trap the quanta four times as frequently, but there should be no other difference. This, as Lorentz pointed out in 1906, is quite at variance with our everyday experience. When the light of a star passes through a telescope and impresses an image on a photographic plate, this image is not confined to a single molecule or to a close cluster of molecules as it would be if individual quanta left their marks like bullets on a target. An elaborate and extensive diffraction pattern is formed: the intensity of the pattern depends on the number of quanta, but its design depends on the diameter and also on the shape of the object glass. Moreover, the design does not bear any resemblance whatever to the 'trial and error' design which is observed on a target battered by bullets. It seems impossible to reconcile this with the hypothesis that quanta travel like bullets directly from one atom of the star to one molecule of the photographic plate."

The wave theory explains the above phenomena perfectly. It does not, however, explain the emission of electrons under the influence of X rays, as is emphasized by the following quotation from Dr. Ellis:

"To take a definite case, suppose X rays are incident on a plate of some material, then it is found that electrons are ejected from the plate with considerable velocities. The number of the electrons depends on the intensity of the X rays and diminishes in the usual way as the plate is moved farther from the source of X rays. The velocity or energy of each electron, however, does not vary, but depends only on the frequency of the X rays. The electrons are found to have the same energy whether the material from which they come is close to the X-ray bulb or whether it is removed away to any distance.

"This is a result which is quite incompatible with the ordinary wave-theory of radiation, because as the distance from the source increases the radiation spreading out on all sides becomes weaker and weaker, the electric forces in the wave-front diminishing as the inverse square of the distance. The experimental result that the photo-electron always picks up the same amount of energy from the radiation could only be accounted for by giving it the power either to collect energy from a large volume or to collect energy for a long time. Both of these assumptions are unworkable, and the only conclusion is that the radiated energy must be localized in small bundles."

"Artificial Skies" for Science Museum

Astronomy

People in Philadelphia will soon have the opportunity of seeing stars of any place or time just as do the residents of Berlin, Vienna, Rome and a dozen other European cities. This is made possible with the Zeiss planetarium which has just been presented to the Franklin Institute by Samuel S. Fels, Philadelphia philanthropist. It will be installed in the first section of a great science museum which the Institute will erect as a memorial to Benjamin Franklin, with the aid of the Benjamin Franklin Memorial, Inc., made up of leaders in public life and affairs in Philadelphia. The site chosen was leased by the City of Philadelphia, and consists of a large city block on the Parkway, facing Logan Circle, adjacent to both the new Public Library and the Academy of Natural Sciences.

As the planetarium instrument is expected to be delivered during the coming winter, the south wing of the building, to be devoted to astronomy, will be erected immediately, and will probably be ready for visitors next spring, said Dr. Howard McClenahan, secretary of the Institute.

The preliminary plans for this section of the building call for the planetarium dome, about 65 feet in diameter, on the ground floor. In the space between it and the outer walls will be a series of rooms devoted to various astronomical exhibits, such as the spectra of the sun and stars. On the top floor will be an observatory with both a reflecting and refracting telescope through which visitors can look at the heavenly objects. The rest of the top floor will also be devoted to astronomical exhibits. In the northeast corner of the building will be hung a Foucault pendulum. Visitors on the ground floor will be able to watch this change the direction of its swing as it oscillates back and forth, and so see a proof of the earth's rotation.

The planetarium, which will be the chief feature of the astronomical wing, is a glorified stereopticon, or magic lantern. One hundred and nineteen separate lenses project the images of all the naked-eye stars and planets, the sun and the moon on the inside of a white cloth-lined dome. It is equipped with motors that turn it to simulate the apparent daily motion of the heavenly bodies across the sky because of the earth's rotation. Other motors turn the instrument so that the slow conical swing of the earth's axis over a period of 26,000 years can be shown. These celestial motions, and those of the planets in their orbits, can be speeded up so that the changes that normally take place in hundreds or even thousands of years, are shown to the planetarium observer in a few minutes. The operator can also show the stars as they appear from the north pole, or from the southern hemisphere, where constellations appear that never rise above the horizon in northern countries. And when he wishes, by pressing a button, he can turn on a set of auxiliary projectors, which show the names of the constellations in the sky in their proper places. So realistic is the planetarium that the visitor, when he hs been in the dome for some minutes, and his eyes are adapted to the darkness, seems to be under an open night sky, but a sky far clearer than any visible from a large city.

The famous Carl Zeiss optical works of Jena, Germany, are the originators of the planetarium. The first one was made for the German Museum at Munich, which, with nine miles of aisles for exhibits, is the greatest science museum of the world. So popular did it prove that an improved model was made which was installed by a number of other German cities, including Berlin. Another was erected in Vienna, then one was installed in Rome. Still another is being completed in Moscow, and it has recently been announced that one has been ordered for Milan by a newspaper owner.

Two have been ordered for the United States. Besides the one ordered by Mr. Fels, one has been ordered for Chicago by Max Adler. A building to house this and an astronomical museum is being erected on an island in Lake Michigan, near the Field Museum, and will probably be completed next spring also.

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"Rheumatic" Weather Prophecies

Meteorology

The popular notion that people suffering from "rheumatism" are good weather prophets has received scientific confirmation in a study just reported to the American Medical Association by the investigators, Drs. Edwin B. Rentschler and Francis Vanzant of the Mayo Foundation, and Dr. Leonard G. Rowntree.

"We now feel certain that many of our patients with arthritis can, through an increase in the severity of their pain, sense the approach or presence of storms," reported the scientists. They studied 367 patients suffering with arthritis, the scientific name for common "rheumatism", for a period of a year. For more than 90 per cent. of the time the records showed a relation between the presence of storms and the increase of pain.

The investigators stated that, of course, it is hard to interpret and put a quantitative value on a subjective symptom like pain. So while the measurements of atmospheric pressure changes, humidity, temperature and the like could be accurately made, measurements of increase in pain were not necessarily so exact.

"For 72 per cent. of the time the patients appeared to suffer more pain as the barometric pressure fell, and with a rise they experienced relief. . . . For 21 per cent. of the time the curve of the pain went up when the barometric curve went down and vice versa," stated the report. "Observations on humidity, temperature, and atmospheric electricity were inconclusive, although it is possible that these agents working together have some effect."

The study was undertaken not to prove that the "rheumatic" weather prophets are right, but to determine whether a relationship actually exists between arthritic pain and weather change. Just how the change acts to produce the pain is not yet known, although it may act by affecting the blood supply to the joints. Investigations with a pressure chamber would throw some light on this problem, and perhaps on the more general problem of the relation between weather changes and other ailments, the three physicians thought.

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Sweeter Milk Sugar Made Commercially

Physiological Chemistry

A form of milk sugar, called beta lactose, sufficiently sweet to be used as a table sugar, is about to be produced commercially through the efforts of Dr. John Harvey Kellogg, director of the Battle Creek Sanatarium.

The usual form of lactose is a chalk-like, slightly sweet powder that is difficult to consume in quantity. Since milk sugar is sometimes used therapeutically as a substitute for ordinary table sugar, chemically known as sucrose, the production of a form of lactose three times as sweet and three times as soluble as commercial lactose is likely to prove of value to medical practice. Patients will be able to substitute the beta lactose for the common sucrose of the table and this milk sugar will be taken as a food rather than an unpalatable medicine. It is about a third as sweet as ordinary sugar and will cost about fifteen to twenty times as much per pound.

Some physicians believe that lactose is preferable to the ordinary sucrose, produced from sugar cane or sugar beets, as a source of sweet carbohydrate in the diet. It is more slowly absorbed in the system than other sugars and it is claimed to promote the growth of more beneficial bacteria in the lower portion of the alimentary canal. Lactose is formed nowhere else in nature than in the milk of mammals, not even in their blood. The fact that the bodily processes take the trouble to make this special sugar for the mother's milk caused scientists to discover that lactose seems to play an important part in keeping babies from such diseases as typhoid, dysentery and cholera. Predatory microbes cannot thrive in the infant's food tract because they cannot live in the lactic or buttermilk acid that the fermentation of lactose produces. A special sort of bacteria, *Bacillus bifidus* populates the lower food canal of nursing babies and these bacteria are the helpful agents that transform the lactose into the protecting lactic acid.

The theory back of the suggested substitution of lactose for sucrose as a special dietary measure is that such a protective bacterial action would be created in the lower food tract of the adult by the liberal use of the milk sugar.

It has been known for seventy-five years that lactose exists in two forms having the same chemical composition, twelve atoms of carbon, twenty-two atoms of hydrogen and eleven atoms of oxygen to the molecule, but differing in physical properties. A quarter of a century ago, Dr. C. S. Hudson, the American sugar chemist formerly at the U. S. Bureau of Standards and now at the U. S. Hygienic Laboratory, clearly described the making of the sweeter beta form of lactose. From a solution of alpha lactose or milk sugar of commerce, the beta sugar can be crystallized out at a temperature above 200 degrees Fahrenheit.

Nearly two-fifths of the total solid content in cow's milk consists of lactose, and it is estimated that over a third as much lactose as cane sugar is consumed annually when the lactose content of milk is considered. Dr. Amé Pictet, the Swiss sugar chemist, recently announced that he had succeeded in synthesizing lactose, but the possibility of producing milk sugar in this way or any other way than from milk, is quite remote.

Science News-Letter, July 13, 1929

Young Genius

Biography

FRANCIS TREVELYAN MILLER, in *Lindbergh: His Story in Pictures* (Putnam):

President Coolidge has placed emphasis on Lindbergh's youth (25 years at the time of his first great achievement). It is interesting to record here the names of other youths who have won immortal fame at about this same age:

Alexander the Great conquered the known world at 25; Hannibal had reduced all Spain at 26; Caesar was a powerful leader at 28; Napoleon was winning famous battles at 24; Marshal Ney a division general at 25; Nelson in command at 23; Cromwell a statesman at 29; Lincoln in the legislature at 26; Columbus was leading an expedition at 25; Livingstone began his explorations in Africa at 27; Stanley started out to find him at 26.

James Watt was experimenting on steam as a motive force at 23; Eli Whitney inventing his cotton gin at 26; Edison perfecting new systems of communication at 24; Wagner had composed his first symphony at 19; Goethe his first play at 19; Victor Hugo his first book at 20; Balzac had written thirty-one novels before the age of 26; Michaelangelo had created his great Madonna at 26; Raphael painted a masterpiece at 21; Beethoven was a great musician at 18; Mendelssohn, Mozart, Chopin, Byron, Keats, Shelley had established immortal fame before 29 years of age.

Genetic studies of genius prove that Lindbergh at 25, with his highly developed instinct for navigation in the air, is an historical figure true to type, a natural precursor of a New Epoch.

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Paper money was introduced in China in the ninth century due to a shortage of bronze money.

Asphalt has become the second most important mining product in Switzerland, salt being the first.

The Government is constructing six new lightships, the first to be propelled by Diesel electric machinery.

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Mental State Factor in "Nervous Heart"

Medicine

The mental state plays a big part in the development of a condition known as "nervous heart," Dr. Eugene S. Kilgore of San Francisco told members of the American Heart Association at their fifth annual scientific session. Disturbances of the heart or circulatory system may be the starting point for the nervous heart condition, or it may be caused entirely by the upset mental state.

"The hereditary neurotic type of constitution is the important predisposing cause," Dr. Kilgore said. The neurotic symptoms are often more important than the diseased condition of the organ itself, more important, that is, in the practical sense of producing greater suffering and disability and offering greater possibilities for treatment.

This nervous heart is one of the most common conditions seen by the heart specialist, Dr. Kilgore stated. It is likewise one in which treatment may be brilliantly successful, but unfortunately this condition most often receives poor treatment, largely because the neurotic and psychic factors are overlooked.

Dr. Kilgore cited the case of a young man who had been idle for six months and in bed most of the time because of heart trouble. Careful examination failed to reveal any serious disorder, although the patient complained of various heart symptoms. It was found that the condition had developed suddenly when a doctor who had examined the patient for employment found what he considered a serious heart condition which was freely discussed in the patient's presence. The patient admitted that all his symptoms dated from that day and that previous to that time he had led an active life and had "never known that he had a heart."

Dr. Kilgore said he believed modern civilization plays a large part in the development of mental and nervous disturbances, especially those concerned with the heart.

"I refer not only to the familiar 'pace at which we live,' but rather to the general diffusion of knowledge about the vital function and the diseases of the heart. Valvular disease, high blood pressure and angina pectoris are common fireside topics." While he did not criticize the work of the American Heart Association and similar organizations with philanthropic and educational aims, he pointed out that they had stressed in the minds of the public the prevalence of heart disease. In this lies the proverbial danger of a little knowledge, which in this case might lead neurotic persons to work themselves into a state of nervous and mental disease and possibly as a result into this condition of nervous heart.

"It should be emphasized," he advised, "before the public that most 'heart symptoms' do not mean heart disease at all, and that those who think they feel them should promptly transfer the responsibility to their medical advisors."

Science News-Letter, July 13, 1929

Blames Nerves for High Blood Pressure

Medicine

High blood pressure is chiefly due to that state of nervous irritability popularly known as "nerves," declared Dr. Arthur S. Granger at the meeting of the American Medical Association.

No cure is known for high blood pressure, so the treatment consists in trying to relieve the conditions in the environment that appear to aggravate it. This means attempting to make an excitable patient stop worrying or to displace an excitable nature by a calm one. It is a difficult task, as anyone who has tried it knows.

Dr. Granger suggested that the development of high blood pressure might be avoided in some cases by suitable preventive measures. For instance, young people who have inherited highly sensitive nervous systems or in whose family high blood pressure is frequently found, should not indulge in too strenuous exercise. They should be discouraged from entering careers in which a high tension life is a necessity.

When the condition, which is known to doctors as hypertension, has developed, proper regulation of the patient's life and habits can do much to prolong his life and prevent complications, Dr. Granger said. The patient must be taught to avoid as much as possible business worries and annoyances in the home. Social obligations must be limited and frequent vacations will relieve the tension. Golf, walking, and supervised setting-up exercises are all recommended, though the amount of exercise should be suited to the patient's ability to stand it. Dr. Granger gave drugs only a small place in the treatment of high blood pressure.

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Mendel Memorial

Genetics

Gregor Mendel, the Austrian monk who founded the modern science of genetics, is to be remembered with a monument erected in his native village of Neu-Titschein, Czecho-Slovakia. Dr. Charles B. Davenport, director of the Station for Experimental Evolution of the Carnegie Institution of Washington, has been appointed to promote the project in America.

A group of scientists in Czecho-Slovakia have undertaken to raise $3,000, of which they have now collected $1,500. They are hoping to raise $1,000 of the remainder among American scientists and philanthropists.

Science News-Letter, July 13, 1929

Diet Factor in Diseases

Medicine

Because the average American diet is deficient in certain foods, it actually is a factor in the development of the degenerative diseases, members of the American Medical Association meeting at Portland were told by Dr. Lovell Langstroth of San Francisco.

Dr. Langstroth made a detailed study of the diet of 501 persons suffering from such conditions as high blood pressure, hardening of the arteries, rheumatism, diabetes, heart disease and occasional unexplained headaches. He found that bread, meat, potato, all forms of sweet dessert and accessory foods like butter, cream, sugar and mayonnaise made up 88 per cent. of the diet of these patients. A remarkable improvement took place when they were fed on a diet of vitamin-rich foods, namely, eggs, milk, fruit and vegetables.

The average diet, which is lacking in vitamins and the so-called protective foods, prepared the background for the development of the degenerative diseases, in Dr. Langstroth's opinion. He called such a diet a deteriorating influence, and concluded that the prevalence of this class of diseases among Americans could be greatly reduced or entirely prevented by a different kind of diet, one which contained plenty of vitamins.

Science News-Letter, July 13, 1929

Traces Physical Ails to Emotion

Medicine

A pain in the stomach is not always the real condition that sends people to a physician, Dr. George S. Stevenson, New York psychiatrist, told members of the American Medical Association. The pain or other physical ailment may be real enough, but back of it very often an upset emotional state may be found, Dr. Stevenson explained. He interviewed 150 patients at the Cornell Clinic and found that in many cases there was a big difference between the patient's complaint and his motive in coming to the doctor.

The emotional or mental problems lying back of the pain or loss of appetite complained of are often more serious than the physical ailment, which may be entirely due to the mental or emotional state. Fear of disease, especially cancer, ranks high among these factors. Worry about one's condition, unstable personality, sex maladjustments, death of some member of the family, identification with illness of another (for instance, cancer of a relative), doctor's statements, financial worries, unhappy marital situation and uncongenial home were, in the order given, the emotional problems that brought the 150 patients to the Cornell Clinic for relief of some physical ailment.

These mental and emotional difficulties cannot be ignored in treating the patients. Sometimes psychiatric treatment is required. Ignoring the emotional difficulty may drive the patient to the cultist, who, in the absence of scientific medical training, seizes on this factor and thus gets a firm hold on the patient, Dr. Stevenson declared.

Science News-Letter, July 13, 1929

Anemia Hereditary?

Medicine

That pernicious anemia may run in families appears from a study made of relatives of persons suffering from the disease by Dr. H. Milton Conner of Rochester, Minn. Lack of hydrochloric acid in the stomach, which is a prominent feature of the disease, has a tendency to appear in several members of a family, Dr. Conner reported to the American Medical Association.

The results do not prove that there is any hereditary aspect of pernicious anemia, Dr. Conner carefully pointed out, but they apparently show a family tendency to the development of one of the most important features of the disease.

In his study 154 blood relatives of patients with pernicious anemia were examined. Of these, 25 per cent. showed a lack of hydrochloric acid, as against 15.2 per cent. in a control group tested. The condition was present in 46.1 per cent. of a selected group between 40 to 49 years of age, the period at which pernicious anemia is most common, but occurred in only 16.2 per cent. of the control group of this age.

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Germs Feed on Synthetic Fare

Bacteriology

Beef bouillon, agar, peptone broth and gelatine have so far been the staple articles of diet for disease germs in the laboratories of scientists who were growing them and studying their ways and manners. Now the bacteria are to be put upon a synthetic diet which, whatever the germs may think of it, will certainly make life much easier for bacteriologists and other scientists and will help doctors diagnose diseases with more certainty.

The chemical composition and bacteriological uses of some of these synthetic media on which germs are grown were explained at a recent meeting of bacteriologists here by Dr. Alice T. Merrill of the U. S. Hygienic Laboratory. Dr. Merrill is herself a chemist who has developed some of the synthetic media about which she spoke.

"The problems relating to bacteria and their activities are complex and difficult enough in themselves to investigate. It is, therefore, scarcely an advantage to add to the problem the complications and unknown pitfalls of culture media . . . which are of unknown composition and which may vary in composition with each new lot that is made," said Dr. Merrill.

The importance of this new step in bacteriology cannot be underestimated and goes much farther than being a labor-saving device for scientists. The diagnosis of many diseases depends on delicate bacteriological tests to find the germ causing the disease. Because of the variations in the media with which these tests are made, the tests themselves are not entirely reliable. In making the tests bacteriologists are sometimes working with two more or less variable factors. If one of these can be standardized, the determination of the other, which is the "x" of the problem, becomes much easier and much more accurate.

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No method of preserving fish for museums, to retain their natural color and shape, has been devised, but a recent method of making casts and coloring them with nitro-cellulose lacquer produces lifelike exhibits.

Recommends Cancer Centers

Medicine

Organized cancer centers should be established by the U. S. Government, where full-time specialists and research workers will devote themselves to the study of this disease and acquire special skill in its treatment.

This recommendation has been made to the Senate Commerce Committee by Dr. Ellice McDonald, research worker of Philadelphia.

A special cancer sub-committee of the Senate Commerce Committee will hold hearings soon after the return of the Senate the latter part of August, on the Harris resolution recently passed, calling for the investigation into the whole subject of cancer work with a view to discovering what the United States Government should do to further it in this country.

Dr. McDonald's letter calls attention to the cancer work done by the British Empire and Belgium.

In Belgium the requirements for a grant for a cancer center are:

1. Complete surgical service with facilities for consultation for cancer patients.
2. Installation of machines for deep X-Ray therapy, consisting of at least two pieces of apparatus, with a minimum capacity of 200 kilovolts.
3. An amount of radium of not less than 500 milligrams.
4. A laboratory where research work, examinations and necessary analyses for diagnosis and treatment shall be carried out.

In Great Britain, Dr. McDonald points out, financial assistance is given cancer research centers in order to keep them at maximum efficiency. Also individual cancer research workers are given financial support, under approved conditions.

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CLASSICS OF SCIENCE: The Geology of Niagara

Geology

Never has America had a more appreciative visitor than Charles Lyell, geologist and naturalist, who made a tour of the more settled parts of the country in 1841-2. Working out the geological history of Niagara particularly fascinated him, so that he included the region twice in his itinerary.

TRAVELS IN NORTH AMERICA; with Geological Observations on The United States, Canada, and Nova Scotia. By Charles Lyell. In two volumes. London: 1845.

Falls of Niagara

Aug. 27.—We first came in sight of the Falls of Niagara when they were about three miles distant. The sun was shining full upon them—no building in view—nothing but the green wood, the falling water, and the white foam. At that moment they appeared to me more beautiful than I had expected, and less grand; but after several days, when I had enjoyed a nearer view of the two cataracts, had listened to their thundering sound, and gazed on them for hours from above and below, and had watched the river foaming over the rapids, then plunging headlong into the dark pool,—and when I had explored the delightful island which divides the falls, where the solitude of the ancient forest is still unbroken, I at last learned by degrees to comprehend the wonders of the scene, and to feel its full magnificence. . . .

Recent Proofs of Erosion

It has long been the popular belief, from a mere cursory inspection of this district, that the Niagara once flowed in a shallow valley across the whole platform from the present site of the Falls to the Queenston heights, where it is supposed the cataract was first situated, and that the river has been slowly eating its way backwards through the rocks for a distance of seven miles. According to this hypothesis, the Falls must have had originally nearly twice their present height, and must have been always diminishing in grandeur from age to age, as they will continue to do in future so long as the retrograde movement is prolonged. It becomes, therefore, a matter of no small curiosity and interest to inquire at what rate the work of excavation is now going on, and thus to obtain a measure for calculating how many thousands of years or centuries have been required to hollow out the chasm already excavated.

It is an ascertained fact, that the Falls do not remain absolutely stationary at the same point of space, and that they have shifted their position slightly during the last half century. Every observer will also be convinced that the small portion of the great ravine, which has been eroded within the memory of man, is so precisely identical in character with the whole gorge for seven miles below, that the river supplies an adequate cause for executing the task assigned to it, provided we grant sufficient time for its completion. . . .

NIAGARA FALLS IN 1678 *as it appeared when discovered by Father Hennepin. (Facsimile of a view in Hennepin's original Utrecht edition,* 1697, *reproduced from Lyell's "Travels in North America")*

Discovery by Hennepin

When at Boston, my attention was called by Mr. Ingraham to a work translated from the original French of Father Hennepin, a missionary who gave a description of the grand cataract and a plate of it, as it appeared in the year 1678. It is not wonderful that coming suddenly upon the Falls, which no European traveller had ever seen before, he should have believed them to be twice their real height. "Betwixt the lakes Ontario and Erie," he says, "there is a vast and prodigious cadence of water, which falls after an astonishing manner, insomuch that the universe does not afford its parallel. As to the waters of Italy and Swedeland, they are but sorry patterns of it, and this wonderful downfall is compounded of two great falls, with an isle in the middle, and there is another cascade less than the other two which falls from west to east. I wished a hundred times that somebody had been with us, who could have described the wonders of this frightful fall. In the mean time, accept the following draught such as it is."—From his plate it appears that this third cascade was produced by what he terms "the elbow" caused by the projection of the table rock, which must then have been more prominent than now. . . .

Ancient River-bed

In the absence of more ample historical data, we are fortunately not without geological evidence of the former existence of a channel of the Niagara at a much higher level, before the table-land was intersected by the great ravine. Long before my visit to the Niagara, I had been informed of the existence on Goat Island of beds of gravel and sand containing fluvia- (*Turn to next page*)

Geology of Niagara—*Continued*

tile shells, and some account had been given of these by Mr. Hall in his first report in 1839; I therefore proposed to him that we should examine these carefully, and see if we could trace any remnants of the same along the edges of the river-cliffs below the Falls. We began by collecting in Goat Island shells of the genera *Unio, Cyclas, Melania, Valvata, Limnea, Planorbis,* and *Helix,* all of recent species, in the superficial deposit. They form regular beds, and numerous individuals of the *Unio* and *Cyclas* have both their valves united. We then found the same formation exactly opposite to the Falls on the top of the cliff on the American side, where two river-terraces, one twelve and the other twenty-four feet above the Niagara, have been cut in the modern deposits. . . .

The supposed original channel, through which the waters flowed from Lake Erie to Queenston or Lewiston, was exacavated chiefly, but not entirely, in the superficial drift, and the old river-banks cut in this drift are still to be seen facing each other, on both sides of the ravine, for many miles below the Falls. . . .

The observations made in 1841 induced me in the following year (June, 1842) to re-examine diligently both sides of the river from the Falls to Lewiston and Queenston, to ascertain if any other patches of the ancient river-bed had escaped destruction. Accordingly, following first the edge of the cliffs on the eastern bank, I discovered, with no small delight, at the summer-house, above the whirlpool, a bed of stratified sand and gravel, forty feet thick, containing fluviatile shells in abundance. . . . The same year I found also a remnant of the old river-bed on the opposite or Canadian side of the river, about a mile and a half above the whirlpool, or two miles and a half below the Falls. These facts appear conclusive as to the former extension of a more elevated valley, four miles, at least, below the Falls; and at this point the old-river bed must have been so high as to be capable of holding back the waters which covered all the patches of fluviatile sand and gravel, including that of Goat Island. As the table-land or limestone-platform rises gently to the north, and is highest near Queenston, there is no reason to suppose that there was a greater fall in the Niagara when it flowed at its higher level, than now between Lake Erie and the Falls; and according to this view, the old channel might well have furnished the required barrier.

I have stated that on the left, or Canadian bank of the Niagara, below the Falls, I succeeded in detecting sand with freshwater shells at one point only, near the mouth of the Muddy River. The ledge of limestone on this side is usually laid bare, or only covered by vegetable mould until we arrive at the boulder clay which is sometimes within a few yards of the top of the precipice, and sometimes again retires eighty yards or more from it, being from twenty to fifty feet in height. I also found an old river-bed running through the drift parallel to the Niagara, its course still marked by swamps and ponds, such as we find in all alluvial plains, and only remarkable here because the river now runs at a lower level by 300 feet. This deserted channel occurs between the Muddy River and the Whirlpool, and is 100 yards broad.

There is also a notch or indentation, called the "Devil's Hole," on the right or eastern side of the Niagara, half a mile below the Whirlpool, which deserves notice, for there, I think, there are signs of the Great Cataract having been once situated. A small streamlet, called the "Bloody Run," from a battle fought there with the Indians, joins the Niagara at this place, and has hollowed out a lateral chasm. Ascending the great ravine, we here see, facing us, a projecting cliff of limestone, which stands out forty feet beyond the general range of the river cliff below, and has its flat summit bare and without soil, just as if it had once formed the eastern side of the Great Fall.

Recession of the Falls

By exploring the banks of the Niagara above the Falls, I satisfied myself that if the river should continue to cut back the ravine still farther southwards, it would leave here and there, near the verge of the precipice and on its islands, strata of sand and loam, with freshwater shells similar to those already described. I collected fossil shells, for example, on the left bank, near the Chippewa River, and learnt that others had been reached, in sinking a well, in 1818, at the southeast end of Grand Island. . . .

The patches of fluviatile strata, therefore, occurring between the old banks of drift and the precipice, and not having been met with on other parts of the platform at a distance from the Niagara, confirm the theory, previously adopted on independent evidence, of the recession of the Falls from Queenston southwards. The narrowness of the gorge near Queenston, where it is just large enough to contain the rapid current of water, accords well with the same hypothesis, and there is no ground for suspecting that the excavation was assisted by an original rent in the rocks, because there is no fissure at present in the limestone at the Falls, where the moving waters alone have power to cut their way backwards.

Origin of the Falls

It is almost superfluous to affirm that a consideration of the geology of the whole basin of the St. Lawrence and the Great Lakes can alone entitle us to speculate on the state of things which immediately preceded or accompanied the origin of the Great Cataract. To give even a brief sketch of the various phenomena to which our attention must be directed, in order to solve this curious problem, would require a digression of several chapters. At present the shortest and most intelligible way of explaining the results of my observations and reflections on this subject will be to describe the successive changes in the order in which I imagine them to have happened. . . .

As soon as the table-land between Lakes Erie and Ontario emerged and was laid dry, the river Niagara came into existance, the basin of Lake Ontario still continuing to form part of the sea. From that moment there was a cascade at Queenston of moderate height, which fell directly into the sea. The uppermost limestone and subjacent slate being exposed, the cataract commenced its retrograde course, while the lower beds in the escarpment were still protected from waste by remaining submerged. A second fall would in due time be caused by the continued rise of the land and the exposure of the hard beds constituting what is called the Clinton group, together with the soft and easily undermined red shale, on which they repose. Finally, a third cascade would in all likelihood be produced by the rise of another hard mass, the quartzose sandstone resting on a very destructible red shale. Three falls, one above the other, very similar in (*Turn to next page*)

Nature Ramblings

By Frank Thone

Katy Did

Or did she? The most ancient argument in the world is being carried on in a million trees by ten million green-robed barristers, who have either had the case in court for so long that they have forgotten what it is about, or else regard Katy's alleged conduct as being of unmentionable enormity. At any rate, the prosecution shouts stridently all night long that Katy did, Katy did, she did, she did; while the defense maintains as stoutly and as repetitiously that Katy didn't. And the weary and disgusted human jury, knowing nothing about the case, drowsily curse Katy and wish that the lawyers would shut up.

But these green nocturnal grasshoppers have other business besides their eternal argument. There is the important matter of producing eggs, for instance. Nothing could be more nice and fastidious than the family arrangements that one of the southern katydid species makes. The maternal insect moves up a twig or the edge of a leaf, leaving a trail of pearly little oval eggs strung out in a curious double overlapping row. These split finally and out crawl the rising generation, very small and spectral-pale. They do not assume their robust greenness until after shedding their coats about half a dozen times.

There is another southern Katydid so large as to repay hunting with firearms. An ardent young collector, who had served in the war and knew something about night operations, fixed a small searchlight on his cap, to illuminate his prey in the tall trees. His artillery consisted of a small rifle loaded with dust-shot cartridges, to stun the giant insects and knock them off their perches.

Science News-Letter, July 13, 1929

Thomas Jefferson invented the first plow to turn over the soil as well as lift it.

Psychiatrists Not Ready for Crime Study

Psychiatry

If President Hoover's National Commission on Law Observance and Law Enforcement were to turn the whole problem of dealing with convicted criminals over to the psychiatrists, the psychiatrists would find themselves unable to offer an immediate solution to the problem.

"I, for one," said Dr. Nolan D. C. Lewis, of St. Elizabeth's Hospital, a U. S. Government Hospital for the Insane, "would not wish to attempt it."

Not that Dr. Lewis believes crime outside the field of psychiatry. Quite the contrary. He says:

"Every man who commits a serious crime against either person or property is abnormal. No person who has been brought up with any knowledge of the law, and with ordinary training as to right and wrong will break into a house and rob or make a murderous attack upon another unless that person is in an abnormal state."

The principal contribution which the psychiatrist can make toward solving the problem of reduction of crime is to offer a new point of view.

"When you have studied a problem until it appears to present an impassable barrier," he said, "a fresh point of view will enable you to attack the difficulty with new weapons and may lead in the end to the removal of the obstacle."

The psychiatrist would treat crime as a disease. He would give it the same systematic and thorough research that has been devoted to such diseases as cancer and tuberculosis. He would treat the criminal as enlightened communities treat those suffering from contagious or infectious diseases.

"Society has a perfect right to protect itself from these individuals even at the expense of the person afflicted," Dr. Lewis explained, "but imprisonment should be employed only as a matter of precaution, protection, or for the purpose of treatment; not in a spirit of revenge for wrongs done, or to satisfy the sadistic tendencies of the group.

"I do not object," he went on, "to the annihilation of the individual if he is incurably criminal and murderous, or if for any other reason the protection of society makes it desirable. I believe that we cannot emphasize too strongly the interests of society. This does not mean, however, that a life should be forfeited for every murder. Not every murderer is a permanent menace to society. The person who committed the Hall-Mills murder, for example, probably never committed another crime and probably never will. Under those circumstances it may be just as well for society that the murder should never be solved."

The psychiatrist would want to know what is being accomplished in reform institutions toward rehabilitation of the individual—toward the cure of his criminal tendencies. No physician would prescribe year after year a certain course of treatment for his patients, directing them to follow it for a definite period of time, as six months, a year, five years, or twenty years, and then dismiss them from his mind and never ascertain whether they improved or grew worse. When a new medical treatment is developed, it is tried at first with great caution. The patient is watched with the greatest of care, and if the medicine fails in its purpose, or if it produces any ill effects in the subject, it is abandoned.

Our judges, however, go on prescribing for their patients with no knowledge and perhaps no curiosity as to the result of the treatment. No one has ever demonstrated that a boy

Niagara—*Cont'd*

their geological and geographical position to those actually seen on the river Genesee at Rochester, would thus be formed. The recession of the uppermost must have been gradually retarded by the thickening of the incumbent limestone, in proportion as the Falls sawed their way southwards. By this means the second cataract, which would not suffer the same retardation, might overtake it, and the two united would then be retarded by the large quantity of rock to be removed, until the lowest fall would come up to them, and then the whole would be united into one.

Sir Charles Lyell (1797-1875) was one of the greatest of the long list of Scottish geologists. He contested the idea of violent catastrophes during the earlier epochs of earth's history, and pointed out that all the observed changes could be brought about by causes now in operation if only enough time were allowed for them to act.

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Crime—*Cont'd*

has improved his character as a result of a course in a reform school. No one knows definitely whether the maximum sentence for drunkenness is more or less effective than the minimum sentence. The psychiatrist would advise looking into these matters.

The Commonwealth Fund of New York is fostering a very laudable movement toward the discovery of those factors in the child's environment which tend to lead him toward crime.

Dr. Lewis, while admitting the good that this has done in the specific cases where it has been tried, says the psychiatrist would hesitate to recommend the procedure as a universal practice. He said:

"If every child in the United States who is now living in an unfavorable environment should be removed and placed in a home where conditions are ideal for his development, I am not sure that the race as a whole would be benefited. Undoubtedly, many children who are now headed for the insane asylum or toward criminal careers would be salvaged and made useful citizens. But we must also look at the other side of the picture. We cannot ignore the fact that it is often the adverse condition, or rather the overcoming of it that builds character."

The psychiatric viewpoint toward crime is so new that this field of investigation is practically untouched. Psychiatrists have expressed great willingness to aid in the study of crime, but it is Dr. Lewis' belief that scientific research will have to be conducted for several generations before this profession is ready to make any final recommendations.

Science News-Letter, July 13, 1929

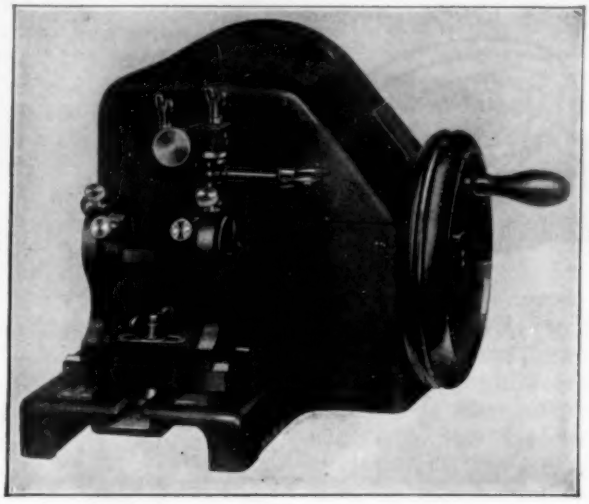
As the Fish See It

Ichthyology

The picture on the cover of this week's SCIENCE NEWS-LETTER is an artist's idea of the apparition that must frequently startle the small fish in the shallow water among the mangrove roots around the seaward edges of Florida. When the water surface is thrown into ripples, it is as impossible to see up out of it as it is to see down into it, so that the bird's feet and his great, hump-beaked head appear as correlated but disjunct phenomena.

The painting is by Wilfrid Swancourt Bronson; photo by courtesy of the Buffalo Museum of Science.

Science News-Letter, July 13, 1929



Minot Automatic Microtome

This instrument was designed by the late Doctor Charles S. Minot, and has been improved by us from time to time until it is now justly one of the most popular microtomes on the market. The latest improvement, of which this is the first listing, consists of a cover completely enclosing the feeding mechanism and a grooved balance wheel which provides for using a motor to operate the instrument. This microtome is an ideal instrument for rapid serial sectioning, cutting sections with accuracy down to one micron in thickness. While regularly furnished for paraffin sectioning only, this model can be equipped for cutting small celloidin specimen.

Two New Improvements

1. The entire feeding mechanism is enclosed in a metal case to protect the working mechanism and to keep out dust. The cam disc which controls the amount of feed is operated from outside the case. The figures indicating the amount of speed can be seen through a glass window provided for that purpose.

2. The jaws wheel is grooved so that the microtome can be operated by a motor when desired.

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FIRST GLANCES AT NEW BOOKS

SCIENCE IN LITERATURE—Frederick Houk Law—*Harper* ($1.20). The College Entrance Requirements in English now require "a collection of scientific writings (about 150 pages)". No one is better qualified to prepare such a collection of essays than Dr. Law, since he is head of the Department of English in the Stuyvesant High School, New York City, and has been one of the pioneers in the once unpopular though now prevailing movement to bring English teaching into the current of modern thought. He strikes the keynote of the endeavor in his preface where he says: "This is not a textbook in Science; it is a textbook in Literature. The subject matter concerns Science in various phases, but the method is the method of literature, the method of inspiration, the method of wonder, of beauty, and even of awe." The essays comprised in the volume are: "Secret of the Charm of Flowers" by William Henry Hudson; "The Insects Are Winning," by William Atherton DuPuy; "Secrets of the Ocean," by William Beebe; "The Moon," by Garrett Putnam Serviss; "The Importance of Dust," by Alfred Russel Wallace; "The Romance of the Diamond," by Sir William Crookes; "Niagara," by John Tyndall; "On a Piece of Chalk," by Thomas Henry Huxley; "Chemistry in Everyday Life," by Edwin Emery Slosson; "Chlorin," by Jean-Henri Fabre; "The Discovery of Radium," by Madame Marie Sklodowska Curie; "The Atomic Theory," by Edward Neville da Costa Andrade; "Autobiography of an Electron," by Charles Robert Gibson; "A Drop of Water," by Henshaw Ward; "A New Light in the World," by William Henry Meadowcroft; "Electricity and Civilization," by Charles Proteus Steinmetz; "Modern Physics," by Robert Andrews Millikan; "The Scientific Revolution," by James Harvey Robinson; "Design in Creation," by Sir Oliver Lodge, and "Pivotal Figures of Science," by Arthur Elmore Bostwick. Each essay is annotated with biographical and explanatory footnotes and supplied with a list of books for further reading and topics for classroom discussion or written reports.

General Science
Science News-Letter, July 13, 1929

OUR WONDERFUL UNIVERSE—Clarence Augustus Chant—*World Book Co.* ($1.52). This little book by the professor of astrophysics at the University of Toronto was reviewed in these pages previously when it appeared in a Canadian edition. It is now in an American edition, and it is to be hoped that it will have the popularity that it well deserves. It can be recommended to anyone wanting a simple, beginning book on astronomy.

Astronomy
Science News-Letter, July 13, 1929

THE EXCAVATION OF ARMAGEDDON—Clarence S. Fisher—*Univ. of Chicago Press* ($1). The famous field of Armageddon is at last being systematically investigated, and the great mound has yielded important traces of old cultures and battles. This progress report describes the excavation of three strata, going back to the Israelite period of the ninth century B. C.

Archæology
Science News-Letter, July 13, 1929

HISTORY OF THE UNITED STATES—Charles A. and Mary R. Beard—*Macmillan* ($1.96). It is becoming fashionable in the writing of school book histories to include advances in science and technology upon equal footing with modern education and manufacturing, all subjects which in past years have been overpowered in the school room by generals and politicians. Significant is the statement of the authors in the preface of this revised edition that they do not now consider it necessary to make undue prefatory emphasis of the adequate treatment of social and economic aspects of our history that this book contains. A proselyting scientist might object to the inclusion in the book when evolution is discussed: 'Some Christians, usually known as Fundamentalists, strenuously opposed such theories on the ground that they were contrary to the Bible or were at best mere guesses that could not be proved." Or when the progress of science during the last half century is discussed, some may object to this indictment: "Nevertheless, in spite of its splendid facilities for work, the United States lagged behind the leading nations of the Old World in the realm of pure science."

History
Science News-Letter, July 13, 1929

CREATIVE IMAGINATION—June E. Downey—*Harcourt, Brace* ($3.75). In these "Studies of the Psychology of Literature," Professor Downey of the University of Wyoming opens up an almost unexplored field, which she is peculiarly qualified to penetrate because she combines in herself three requisites; she is a poet; she has been a teacher of English literature; and she is a research psychologist. So, when she tackles a subject like the sensations of smell and taste excited by a piece of poetry, or the color and music of a "word-in-itself", or a projection of the unconscious as manifested in the creative dreams of the poet and scientist, or the methods of stimulating the adolescent imagination, she is dealing with subjects which she has personally investigated in her classroom and laboratory. "Creative Imagination" is a book that will be of especial interest and practical value to the psychologist, to the teacher or writer of literature, and to all who are interested in the action of art on human emotions.

Psychology
Science News-Letter, July 13, 1929

ACHIEVEMENT TESTS IN THE MODERN FOREIGN LANGUAGES—V. A. C. Henmon—*Macmillan* ($1). The aim of the research reported here was to build achievement tests that might become standard. Tests thus developed have proved reliable and valid instruments of measurement on a nation-wide basis, the report states. Equally important, norms of achievement in modern languages have been established for school and college. The work was part of the program conducted by the Modern Foreign Language Study and the Canadian Committee on Modern Languages.

Education
Science News-Letter, July 13, 1929

SOAP BUBBLES—Ellen Beers McGowan—*Macmillan* (80c). Children who enjoy this book for its story-book style, will unconsciously learn a great deal of popular science.

Physics
Science News-Letter, July 13, 1929

PRODUCTIVITY OF LABOR IN NEWSPAPER PRINTING—S. Kjaer—*Government Printing Office* (50c). An economic study like this is interesting not only to the newspaper publisher but to anyone concerned with the tremendous flow of cellulose and carbon that hourly takes information to the public.

Printing
Science News-Letter, July 13, 1929

First Glances at New Books—*Continued*

THE SMITHSONIAN INSTITUTION—Webster Prentiss True—*Smithsonian Institution Series, Inc.* (50 Church Street, New York City). The American people have now an opportunity for the first time to realize the extent and variety of the public services of the Smithsonian Institution at Washington. These 12 volumes beautifully illustrated in color and monochrome are prepared and published by subscription for the purpose of increasing the endowment of the Institution. The first volume is largely historical beginning with the unexpected bequest of James Smithson, an Englishman who had never been in the United States and had never manifested any special interest in that country. So it was a surprise when, in 1835, the Secretary of State received a letter from a London notary informing him that the United States was entitlted to half a million dollars "for the increase and diffusion of knowledge among men," and five years later there was delivered at the Philadelphia mint 105 bags of sovereigns, eight shillings and sixpence. From this has developed the National Museum, Bureau of American Ethnology, National Zoological Garden, Astrophysical Observatory, National Gallery of Arts, International Exchange Service, International Catalogue of Scientific Literature, Freer Art Gallery, and the numerous technical and popular publications in all fields of science that are accessible to the American people in their public libraries.

General Science
Science News-Letter, July 13, 1929

THE ROMANCE OF MODERN EXPLORATION—Fitzhugh Green—*American Library Association* (cloth, 50 cents; paper, 35 cents). The books recommended in this Reading With A Purpose Series are: The Polar Regions in the Twentieth Century, A. W. Greely; The South Pole, Roald Amundsen; The Adventure of Wrangel Island, Vilhjalmur Stefansson; Skyward, Richard E. Byrd; Beneath Tropic Seas, William Beebe; On the Trail of Ancient Man, Roy Chapman Andrews.

Exploration
Science News-Letter, July 13, 1929

COREGONID FISHES OF THE GREAT LAKES—Walter Koelz—*Govt. Printing Office* ($1.10). A monograph covering the scientific aspect of one of the most important of American freshwater fisheries.

Ichthyology
Science News-Letter, July 13, 1929

THE SUN AND THE WELFARE OF MAN—Charles Greeley Abbot—*Smithsonian Institution Series.* This volume, the second of the sumptuous Smithsonian Scientific Series, is likely to prove one of the most popular of the twelve, since it is written by the Secretary of the Institution and concerns a subject in which we are all interested. Each will find his own as he opens it. The housewife will be struck by the picture of the solar cooker which Dr. Abbot set up for his summer home on Mt. Hamilton, California. The attention of the mother will be drawn to that of the children cured of rickets by the ultraviolet rays. The horticulturist will stop to consider the effect of differences in the wave-length or duration of light in stimulating the growth of plants. The engineer will be surprised to learn of the many projects for a solar engine that will take the place of coal. And besides these practical aspects of the book every intelligent reader will be interested in learning how sunlight can be measured and analyzed.

Astronomy
Science News-Letter, July 13, 1929

INTRODUCTION TO SCIENCE—Otis William Caldwell and Francis Day Curtis—*Ginn* ($1.68). It has been found exceedingly and unexpectedly difficult to find a satisfactory textbook for the course in general science which is nowadays being required in nearly all the high schools. This newest candidate to enter the lists should have a good chance for the championship because it has been prepared by two experts in the field, who have had the use of the studies, experimentation and experience of recent years. Dr. Caldwell is director of Institute of School Experimentation of Teachers College, Columbia, and Dr. Curtis is head of the department of general science and biology in the University High School of Michigan. The selection of topics is based upon a synthesis of eighteen investigations as to the most suitable subject matter of such a course. The vocabulary is almost entirely confined to the 5,000 most frequently used words in the English language as determined by Thorndike. The text is written in a simple and interesting style, the illustrations are drawings designed to point out a particular fact, and the questions and exercises are contrived to be most useful to the student and teacher.

General Science
Science News-Letter, July 13, 1929

OUR CHANGING CIVILIZATION—John Herman Randall, Jr.—*Stokes* ($3). It is rare to find a book where such great learning is carried with a current of such a readable style. Professor Randall sweeps over a series of centuries in the same effortless effect as any one of us would in telling of what happened yesterday. He is one of the few philosophers who has come to appreciate the fact that the advent of applied science, machine power and mass production is an unprecedented factor in civilization that is bound to transform our social forms, religion, ethics and metaphysics. He does not presume to prophesy in detail the form this new civilization must assume, but presents with great pungency and wit the signs of the times that show the inevitabllity of the change.

Philosophy
Science News-Letter, July 13, 1929

SUNRAYS AND HEALTH—Ronald Millar with E. E. Free—*McBride* ($1.50). There is no question now exciting more general popular interest than the utilization of rays of various sorts for the improvement of health, but the public is confused by the various fadists and fakers who make extravagant claims for every new thing and by the rival manufacturers of artificial ray lamps. This little book, giving a sane survey of the subject at its present stage, in non-technical terms, therefore, serves a useful purpose.

Therapy
Science News-Letter, July 13, 1929

WHAT ABOUT THE YEAR 2000?—*Federated Societies on Planning and Parks.* ($1). It is encouraging that some one is looking forward to the year 2000. Land is one of the most fundamental resources that must be available to the present and the future population of this country. This study, prepared under the direction of a committee sponsored by five societies interested in parks, cities and the conditions under which we live, is the trail towards the preservation of our land areas for poserity.

Economics
Science News-Letter, July 13, 1929

DIRECTED STUDY GUIDES FOR KNOWLTON'S INTRODUCTION TO WORLD GEOGRAPHY—Alma Leonhardy, Grace W. Hogoboom and Elizabeth Van Patten—*Macmillan* (48c). A booklet aimed at the more painless administration of geography to the pupils.

Geography
Science News-Letter, July 13, 1929

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